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ABSTRACT

The Skills Standards Projects have provided further emphasis on the need for benchmarking U.S. vocational-technical education (VTE) against international competition. Benchmarking is an ongoing systematic process designed to identify, as quantitatively as possible, those practices that produce world class performance. Metrics are those things that are to be measured in a performance system. Each must have a measurement process designed to determine objectively the status of both the benchmarker and that which is benchmarked on that metric. Types of metrics include the following: an exam, number of hours to produce a program completer, operating budget per student, placement rate of students in directly related jobs, and employer satisfaction with the quality of the completer. For benchmarking to have utility in VTE, the metrics chosen must keep the process relatively easy and yield results useful for program improvement. For a VTE benchmarking model to be of benefit to practitioners, it must review elements found in a high quality VTE program. The product of the VTE system is an individual prepared to be a productive employee. In the design of a system to benchmark VTE programs and the products of those programs, there are numerous elements to be considered. They can be identified within two categories: those elements of process and those characteristics of product. The most compelling reason to benchmark in VTE is the need to improve the quality of the product. (YLB)

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A BENCHMARKING MODEL

BENCHMARKING QUALITY PERFORMANCE
IN
VOCATIONAL TECHNICAL EDUCATION

Presention

at the

American Vocational Association Annual Conference

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Charles Losh, Ph.D.

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THE VTE BENCHMARKING MODEL

BENCHMARKING QUALITY PERFORMANCE

IN

VOCATIONAL TECHNICAL EDUCATION

Charles Losh, Ph.D.

Introduction

One of the major challenges facing vocational technical education (VTE) is a perception, deserved or other wise, that VTE programs are not providing "world class" employees. Another challenge, directly linked to the first, is the recommendation that education, and especially vocational technical education, benchmark against our international competition.

Benchmarking is a process widely used by major manufacturers, but one that is not familiar nor widely used in education. Recently, the Skills Standards Projects sponsored by the United States Departments of Education and Labor have provided further emphasis on the need for benchmarking United States VTE at the international level. The opportunity and need to benchmark the standards to a world class level were paramount. The problem, however, was a lack of information as to how this was to occur. Even more simply, what is benchmarking and how could and should the concept be applied to VTE?

Benchmarking has many definitions but there are common characteristics. In the manufacturing models reviewed, there were common themes in all of the processes. Those themes provided the basis for The VTE BENCHMARKING MODEL described in this paper. This model has utility not only for selected standards projects, but for entities interested in providing information that will enhance the competitiveness of industries and individuals in the United States.

Benchmarking in Business and Industry

The International Benchmarking Clearinghouse (1992) describes benchmarking as follows:

> Simply stated, benchmarking is finding and implementing best practices. It is a process of comparing your organization and processes to leaders anywhere in the world and using that information to take action that will improve performance. (p. 1)

Business and industry are heavily involved in benchmarking, almost all FORTUNE 500 companies have conducted a benchmarking project, with some viewing benchmarking as a way of life.

In 1989 the MIT Commission on Industrial Productivity reported that:

> ...a characteristic of all the best-practice American firms, large or small, is an emphasis on competitive benchmarking. Comparing the performance of their products and work processes with those of World Leaders in order to achieve improvement and measure progress...

Sources reviewed in the development of The VTE Benchmarking Model included articles in journals produced by both academics and practitioners, and presentations by practitioners from respected and recognized manufacturers. Clearly however, benchmarking processes are still evolving, and as Ford (1993) observed:

> At this early point in the development of benchmarking, no single model has emerged to guide prospective benchmarkers. Instead, a variety of competing models exists, encompassing anywhere from four to as many as 11 steps. (p. 38)

Although there were differences in terminology and approach, there were common elements in the representative literature reviewed. The common elements included concerns that the "metrics" (what is to be measured) be clearly identified, and that benchmarking be conceptualized as a systematic process.

Continuous improvement is a theme that provides context for benchmarking, as identified by Watson (1992) of Xerox Corporation:

> The purpose of benchmarking is to help a company identify what it needs to improve and how it needs to improve by studying the methods used at companies that have been successful. Benchmarking is an approach to organizational learning that makes comparative, quantitative assessments to discover gaps in performance. Once a gap is identified, the cause of performance differences between the companies is analyzed. Companies conduct benchmarking studies both to learn what levels of performance are possible and how that performance has been achieved. (p. 38)

It is clear from Watson's remarks that benchmarking uses specific metrics for quantitative comparisons between a benchmarked entity with high quality products and a benchmarkee desirous of performance improvement. In benchmarking parlance, these are the "benchmarking partners". It is assumed that there is agreement between the parties to participate in the data gathering exercise. If agreement and cooperation does not exist, then benchmarking will not occur. If there is not agreement and an awareness, then obfuscation of data is the most likely result.

Once the data from the metrics are available, gap analysis is used to determine the need for modification of the benchmarkee's production process. Benchmarking is ultimately an inquiry process designed to identify what works and why it works, literally a best-practices approach to developing quality. Once a successful practice is identified, it becomes a benchmark and serves as a reference point for establishing internal goals and objectives for increased performance.

From these sources it can be seen that benchmarking of international performance, and more specifically, benchmarking the quality of world class vocational technical education programs, will be an ongoing process. Although there is an obvious need for a snapshot of performance and the

characteristics that yielded that level of performance, benchmarking is not simply a snapshot. Benchmarking is an ongoing systematic process designed to identify, as quantitatively as possible, those practices that produce world class performance. This is true regardless of whether that performance is designed to produce a world class automobile or a world class technician.

The Metrics

The use of the term "metrics" in this context is not familiar to vocational technical educators. Metrics, as used in benchmarking, does not refer to units of measure in the metric measurement system such as meters or grams. Metrics are, most simply stated, those things that are to be measured in a performance (competency based) system. Although quantification for comparative purposes is a major activity in a benchmarking system, according to Ford (1993), there are caveats.

> Although experts caution that benchmarking is not synonymous with measuring, the issue of what to measure is clearly one of the thorniest problems confronting would-be benchmarkers. Choosing the wrong set of metrics is one of the surest ways to doom a benchmarking study. A related problem is making comparisons based on measures that have been calculated differently, akin to the age-old "apples and oranges" dilemma. (p. 38)

For a decision to be made relative to the quality of a system, a common understanding of what is important in determining product quality is mandatory. This is critical given that what is measured will be what is important. Another way of thinking about this is to ask, "What are valued characteristics of the product?" In the case of an automobile, a valued characteristic is the number of defects per unit, since defects are ultimately the cause of concern on the part of the consumer. In a quality system for producing vehicles, a metric would be defects per unit. Since that is a valuable characteristic, the questions become "How does one company produce vehicles with such a low defect rate?" "What are the production processes that cause this phenomena?"

Likewise, in vocational technical education, a valued characteristic of a VTE program completer is the ability to quickly become a productive employee with limited employer preparation. Virtually all new employees have a time frame required for learning the specific routines and process of a new employer, but minimization is desired.

The VTE benchmarker must also choose metrics that impact the quality of the product. These metrics include data such as cost per student, number of hours of instruction, and other program variables familiar to experienced VTE participants. When choosing the metrics, the most critical point is that the benchmarking partners will use the same metrics; no more, no less. No comparative analysis can be made on unlike data. This means that the benchmarking partners must agree on the metrics, and the customer must also verify the metrics used for product quality measures.

Although each benchmarking process will have its own metrics, figure 1 provides examples of potential metrics for VTE benchmarking.

- The absolute technical skill level of completers
- The absolute academic skill level of completers
- The technical skill gain using pre-post measures
- The related academic skill gain using pre-post measures
- The "time on task", both classroom and laboratory
- The number of hours required to produce a completer
- The frequency of business industry curriculum input
- The amount of business industry hard/soft ware contribution
- The academic qualifications of the instructor(s)
- The prior workplace experience of the instructor(s)
- The state-of-the art status of the instructional hardware
- The state of-the-art status of the instructional software
- The appropriateness of the instructional environment
- The placement rate of students in directly related jobs
- The placement rate of students in related jobs
- The placement rate of students in non-related jobs
- The employer satisfaction with the quality of the completer
- The operating budget per student
- The cost per placement
- The personal characteristics of the students
- The academic ability level of incoming students
- The technical ability level of incoming students
- The opportunities for workplace experience while training

figure 1.

Although the above list is extensive, the potential benchmarker will be able to identify metrics that fit the proposed benchmarking process. In choosing the metrics to be used in the benchmarking process, discipline is critical. Each of the metrics must have a measurement process designed to objectively determine the status of both the benchmarker and benchmarkee on that metric. The chosen metrics must, when applied, yield like data. Snapshots of status, without comparable data on both parties, is of limited or no value. The benchmarker must be able to identify discrepancies in performance using quantitative processes to assess comparable processes.

One of easiest metrics (performance indicators) to identify and use is an exam of the type used by the National Institute for Automotive Service Excellence (ASE) to certify automotive technicians. The results of this test provide an excellent metric (the absolute knowledge or skill level of a completer at a given point in time), assuming the test is administered at the same point in time in the individuals experience. Other metrics that might be chosen include the number of hours to produce a completer, the operating budget per student, the placement rate of students in directly related jobs, employer satisfaction with the quality of the completer, and others from figure 1 or determined by the benchmarkers. For benchmarking to have utility in VTE, the metrics chosen must keep the process relatively easy and yield results that are useful for program improvement. In the ASE example, suggested performance metrics would be high ASE scores, a high placement rate as an automotive technician, and employer satisfaction with the employee's performance.

Discipline will be required to agree on common metrics that can be applied to all VTE programs. Without the discipline of common metrics, program improvement will continue to be ad hoc. The best practices will continue to occur on a limited basis, which does not move the VTE enterprise forward.

Benchmarking Vocational Technical Education

For a VTE Benchmarking Model to be of benefit to practitioners, it must review the elements found in a quality vocational technical education program. Quality is a subjective term that is difficult to conceptualize, and is nearly always in the eye of the beholder. Recently, however, quality has been defined for business and industry in ISO 8402 (the International Standard for term definitions for the ISO 9000 series of standards) (Rothery 1993):

> ...the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs.
>
> The VTE Benchmarking Model will use the ISO definition of quality.

A quality product of the VTE system is an individual prepared to be a productive employee of an organization. Productive in all senses of the word,

including not only those technical skills required to interact with the technical environment, but also those skills required to positively interact with the human environment.

In the design of a system to benchmark VTE programs and thereby, the products of those programs, there are numerous elements to be considered. Those elements can be identified within two categories: those elements of PROCESS, and those characteristics of PRODUCT. Looking at either of these isolated from the other will not yield adequate information to determine those system characteristics that resulted in a quality product.

Simply stated, the purpose of benchmarking is to identify and model quality performance. The VTE Benchmarking Model is shown in figure 2.

The VTE Benchmarking Model

1. Identify the metrics to be used.
2. Use the metrics to assess a quality VTE program.
3. Use the metrics to assess the VTE program to be improved.
4. Identify performance levels achieved by each partner on all metrics.
5. Identify how high performance was achieved by the quality program.
6. Identify what needs to be modified to improve the inferior performer.
7. Identify how the performance on selected metrics can be improved.
8. Apply the improvement tactics.
9. Re-assess using the metrics to determine performance improvement.

figure 2.

Using The VTE Benchmarking Model, a benchmarking instrument can be developed to meet the needs of the specific VTE program to be benchmarked. A critical point, however, is that for benchmarking to be truly effective step eight must include activities that will cause change. Numerous change models exist, but establishing goals and providing mechanisms to enable change are critical. Without action on the existing system using data from the benchmarking exercise, quality will not improve. Simply conducting selected steps of the process will not yield changes in quality. Commitment to improvement by all stakeholders must be in place for results to accrue from the benchmarking process.

The data from the process metrics will show the possible level of performance on each metric. This data will provide indicators of the practices of the quality program that can ultimately be adopted by the program to be improved. There will be gaps or discrepancies in performance between the programs, and analysis of the discrepancies will identify the cause of performance differences that determine areas needing improvements.

For example, the number of hours (time on task) may be less in the lower performing program. This would target an area for change, although there is certainly no guarantee that more hours will produce a higher quality product. The benchmarking study would include what happens during those hours. Seat time is generally not the answer to higher performance, but the quality of those hours will impact performance.

Most simply stated, performance improvement will occur through adoption of the processes of the successful enterprise, replicating what works in the quality

program. Review of the data from the metrics will identify those areas that differ between the benchmarking partners. Once identified, those areas or processes need to be modified to more closely resemble those of the more effective program. Policy level commitment must be gained for the changes, since in many instances the changes will be significant, and differ radically from present practice. Improvement may or may not come easily. In some instances, relatively simple modifications of process will yield radical improvements in product.

On some metrics, comparison of the data will show very small differences in performance. Where there is small data variance, there is no need to develop objectives for process changes.

Recalibration of the metrics to reflect experience in the benchmarking process will be required as part of the improvement process. It is unlikely that the initial benchmarking exercise will yield the desired improvement without repeated cycles through the process. One must ask the obvious question, "Is the program performance improving on the metric(s), and if not, why not?". Is it a commitment problem or a measurement problem?

Why Benchmark?

The most compelling reason to benchmark in vocational technical education is the need to improve the quality of our product. If elements of the production system can be improved with a concomitant improvement in product quality, then those elements must be identified and

improved. Follow through on the identification of differences in performance on the metrics will yield program improvement.

Benchmarking is a tool for vocational technical educators continuing to strive for excellence. Determination of the elements that yield quality programs will raise the excellence of all programs. The VTE Benchmarking Model is a tool to guide the VTE benchmarking process, and thereby contribute to the goal of quality VTE products and programs. Benchmarking, carried out on a continuous basis, will improve the enterprise.

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